თბილისის ასტროფიზიკური ასლების ცენტრში № 8. 1945
BULLETIN OF THE ABASTUMANI ASTROPHYSICAL OBSERVATORY No. 8. 1945

თანმიმდვრობლად ჩანაწერი „არილასი მთის ბაქზბალეტი“

მ. ძველთანალ

გარსუალური ღიანი სხეულების და გარსუალურების ხანგრძლივობა იხელმო სწორი დამთავრებული მთლიან გარსუალურტყვიანი წარსულად შესვლაში არჩის შედეგი. Seares -1, ფილიმო ხანგრძლივობა იხილმო იქნა ითვლია ბ-ღიანი გარსუალური ღია სხეულის დამთავრებული გარსუალური „ალპანის ღიას ბაქზბალეტი“ (windows of zone of avoidance).

როგორც ჩვილობა, დაღეს სართული მღეროთ მთლიან გარსუალური ღიანი ხანგრძლივობა 150-180° გრადუსში ზიანი. ადგილის ღია იქნა გრადუსში იმპერატორ გარსუალურების ხანგრძლივობა (Hubble 2). იმპერატორი ღიანი ლითონსხარა ჰქონდა: \( l = 164°, b = -5°.6 \) (Orion-სახელო- საფოლკამა).

მეორე გარსუალური სხეული, რომელი Shapley-3 იხინა, გარსუა-
ლურთა მთლიანის ახლა მერქხმინის და მას ხანგრძლია ოთხი ღია წყალგართები: \( l = 301°, b = -16° \).

გარსუალურ ღია შერეული გარსუალურების ხანგრძლივობა ზიანი იქნა როგორც ზედაპირი. ხანგრძლივობა იქნა 17°36', \( l = 108° \) და 59° იქნა იმპერატორი საბჭო ჰქონდა: \( l = 1332° \) და 48° იქნა განთავარა ღია წყალგართები: \( l = 140° \) და 45° იქნა გარსუალურ ღია წყალგართები (Fig. 1).
### Opaque I Table

<table>
<thead>
<tr>
<th>Window</th>
<th>I</th>
<th>m</th>
<th>s</th>
<th>m-M</th>
<th>E&lt;sub&gt;i&lt;/sub&gt;</th>
<th>P&lt;sub&gt;k&lt;/sub&gt;</th>
<th>E&lt;sub&gt;o&lt;/sub&gt;</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>164</td>
<td>5.6</td>
<td>6.3</td>
<td>B4</td>
<td>8.2</td>
<td>+0.02 ± 0.01</td>
<td>0.44</td>
<td>0.41</td>
<td>+0.05 ± 0.02</td>
</tr>
<tr>
<td>I</td>
<td>150</td>
<td>4.7</td>
<td>B4</td>
<td>8.8</td>
<td>+0.11 ± 0.01</td>
<td>0.58</td>
<td>0.42</td>
<td>0.26 ± 0.02</td>
</tr>
<tr>
<td>II</td>
<td>186</td>
<td>3.3</td>
<td>B4</td>
<td>9.0</td>
<td>+0.04 ± 0.01</td>
<td>0.76</td>
<td>0.60</td>
<td>0.13 ± 0.01</td>
</tr>
<tr>
<td>III</td>
<td>164</td>
<td>2.7</td>
<td>B4</td>
<td>10.1</td>
<td>+0.13 ± 0.01</td>
<td>1.05</td>
<td>0.71</td>
<td>0.18 ± 0.02</td>
</tr>
</tbody>
</table>

The table presents data on windows with different values of I, m, s, m-M, E<sub>i</sub>, P<sub>k</sub>, E<sub>o</sub>, and n. The values of E<sub>i</sub> are in parentheses. The table is used to calculate E<sub>o</sub> using the formula:

\[
E = \frac{\Sigma E_o}{4} = 0.155 \text{ mag kps}
\]

Where:

- E<sub>o</sub> is the total energy of the window.
- \(\Sigma E_o\) is the sum of individual E<sub>o</sub> values.
- 0.155 is the energy factor.
- mag is the energy unit.
- kps is the energy unit.

The calculated value of E<sub>o</sub> is 1.2 g/cm².

The table is used to calculate the energy of the window, which is then used in the calculation of the energy of the entire system.
ON THE ABSORPTION IN THE WINDOWS OF ZONE OF AVOIDANCE

O. A. MELNIKOV

(Summary)

The relation between the color-excess of the stars and the number of extragalactic nebulae for the whole Galaxy has been studied by Sears. It would be rather interesting to investigate the color-excesses of B stars in the windows of the zone of avoidance.

As we know, the large window is situated south of galactic equator between the longitudes 150° and 180°. In this region of the zone of avoidance faint extragalactic nebulae are found (Hubble).

The coordinates of the centre of the window are: l = 164°, b = -5°.6 (in Orion).

The other galactic window discovered by Shapley is situated near the galactic centre and has the coordinates: l = 301°, b = -16°. In this window of zone of avoidance much more extragalactic nebulae are met. Unfortunately this area lies in the southern quadrant of the sky (b = -59°) and could not be observed by Stebbins and his collaborators.

In order to investigate the colours of the stars in the window situated near the antecentre we have used the photoelectric catalogue of colours of 1332 stars by Stebbins.

Besides the stars found in the window we have chosen 3 areas of the zone of avoidance 140 square degrees each (Fig. 1).

The Table I contains the data relating to four regions including the window.

The mean galactic coordinates of the stars are given in the first two columns; the mean apparent visual magnitudes in the third; the mean spectroscopic correction for absorption in the fourth; the mean moduli of the photometric distance (within their mean errors in the sixth; the photometric distances not corrected for absorption in the seventh; the distances corrected for absorption in the eighth; the mean color-excesses per kiloparsec with their mean errors in the ninth, and finally, the number of stars in the group. The photometric distances were corrected for absorption in the usual way.

According to the investigations of several authors and ours, the absorption coefficient per kiloparsec is: \( d_{pp} = 8.1 \cdot E \) on the Stebbins' photoelectric scale.

According to our investigation \( d_{pp} = 6.3 \cdot E \) in the same system. Thus:

\[
\log \rho = \log r + 1.3 \bar{E}
\]

Successive approximations give us \( r \) according to \( \rho \) and \( \bar{E} \). The color-excesses \( \bar{E} \) for a given distance must be reduced to \( E_0 \) relating to one kiloparsec. Otherwise the low value of \( E_0 \) in the window may be explained by the fact that the observed stars are close to the Sun.

As we see from the table the mean color-excess per kiloparsec in the window is less than in the surrounding regions. The account of the factor of the decrease of the density of the absorbing matter with the removal from the galactic plane according to the Berman formula does not change the result as these four regions have low galactic latitudes. The mean observed color-excess is represented as a circle on the given scale (Fig. 1).

The mean photometric absorption in the window is: \( d_{pp} = 8 \cdot E = 0.74 \) per kiloparsec.

Shapley investigating the number of extragalactic nebulae to the definite stellar magnitude in the window near the galactic centre found \( d_{pp} \) less than 0.7 i.e. much less absorption.

In fact, the number of extragalactic nebulae observed in this window is greater than that in the window near the anticentre. Shapley considers the window near the centre so much transparent that we can see the faint variable stars at the distance more than 10 kiloparsecs i.e. probably beyond the galactic centre. The connection of the small color-excesses with the presence of extragalactic nebulae within zone of avoidance shows that the general coefficient due to large particles (meteors) and other nonselective factors according to the law \( k \) is small.

Several authors, recently Greenstein and Henry came to the similar conclusions using different methods.

We receive from our table the mean color-excess per kiloparsec of 34 B stars of all the four regions:

\[
\bar{E} = \frac{\sum \bar{E}}{n} = 0.155 \text{ mag kps}
\]
Thus: \( \alpha_{pg} = 1^\circ 2 \).

The author himself studying the absorption on the base of Cepheids came to the same order of the value for photographic absorption: \( \alpha_{pg} \approx 1^\circ 0 \).

The presence of the large window does not change markedly the mean absorption coefficient.

This conclusion is fairly clear as the whole zone of avoidance consists of separate little windows and dark nebulae i.e. it has, as we know a rather spotted nature. Less than 10 well-known dark nebulae can already give a significant absorption and determining \( \alpha_{pg} \) we always have in view only the mean value in longitude, latitude and distance.

This idea was suggested in the works of Ambarzumian and Gedeladze, Greenstein and others.

Conclusions: 1) The comparative study of color-excess of B stars in the galactic window and neighbouring regions indicates the insignificant role of nonselective factors in the mean absorption.

2) The absorption coefficient (according to 84 B stars equals \( 1^\circ 2 \) i.e. is close to the value obtained from other sources.

December, 1942.